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INFORMATION SYSTEM LITERACY

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Introduction:

Research was conducted for this project to convey the importance of information systems in businesses and how information systems overlap with software development. To better understand information systems, we will also cover several informational topics to increase your proficiency in information literacy.

The role information systems have in business:

Information systems play a central role in data-related processes of a business, which can help businesses reduces the workloads and increase the data usage quality. This can greatly impact the profitability of a business. Business use information systems to collect external and internal data and process the data into usable information which helps the management level of businesses to make better decisions for their company's futures and what new products need to be developed.

Information systems can affect a business in many ways:

Data storage and analyse:

Data of a business has grown to such a large amount that it is no longer physically possible to manually manage the incoming data and information without making errors. As the data keeps on growing, businesses have start to implement information systems that gives companies access to sophisticated and comprehensive databases to store, manage, and analyse the growing incoming data as accurately as possible. Business can then use this accurately stored data to find solutions to future problems (Davoren, 2019). These information systems manages both internal and external data which allows a business to review its overall performance and opportunities outside the company (Davoren, 2019).

Assist with making decisions:

Because information systems can accurately store data in a database, the management level of a business can now use the more accurate information to formulate more advance strategic plans which leads to overall better decisions being made (Davoren, 2019). The information systems provide the external data about the economy environment, leading to better strategic plans.
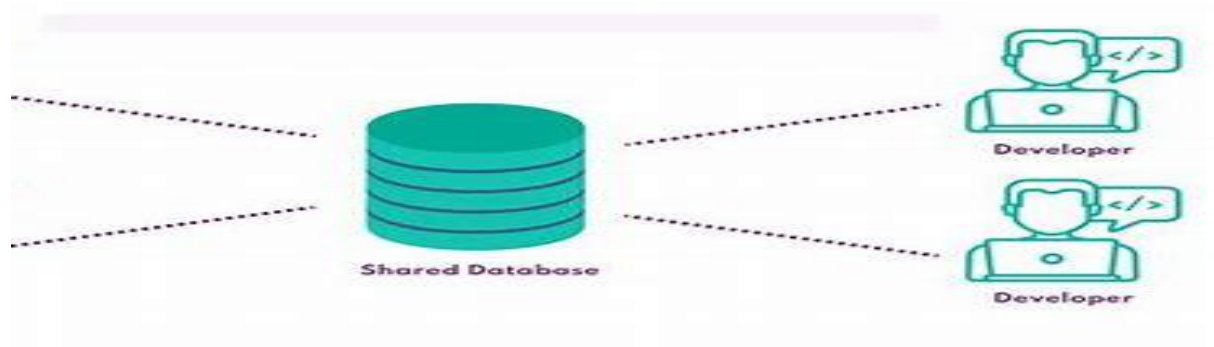
Improved internal communication and collaboration:

Information systems can update the data stored in the databases after it has been analysed. This can increase communications between employees because when someone makes changes to some information on a stored document, those changes will be available to all the employees, keeping the information up to date and making it easier for them to work together (Jones, 2022).

Assist with business processes:

Information systems can be integrated into the may business processes to take over the repetitive task leaving the high-level functions of each task/process to the employees giving them more time to complete the tasks (Davoren, 2019). The information systems also effectively monitor the process it is integrated with which can lead to better project planning.

Data control:

In some businesses not all employees can have access to the data stored in the databases provided by the information systems. This is where the information systems provide another feature called data control. This helps managers and owners of business restrict access to information and limit the number of workers who can be granted access to the database (Jones, 2022). This provides an additional layer of security for businesses.

How information systems overlap with software development:

Information systems and software development walks hand in hand. Software developers must first know what software the clients want and how they want it. To get this information software developers uses information systems to collect data on many of the applications used by clients and what clients expect from the applications.
This collected data is stored by the information system in a database which is then analysed and processed into usable information for the software developers to use to come-up with new ideas to create new and improved software that will be used in future applications to satisfy the needs of the clients.

Information systems and software development are used together in order to create updates for existing applications used by business to improve security and to improve the work environment.

Examples of updates created by software developers using information systems:

Patch security flaws/ security software:

Financial companies such as ABSA and Capi-tech and companies that store and manages a large amount of valuable information/data such as Amazon and Microsoft regularly encounter cyber-attacks from hackers trying to break through the security software protecting their data.

Sadly, sometimes the cyber-attacks where successful and the security software unsuccessful. Information systems are then used to retrieve the data form the cyber-attack and broken security software and then processes the analysed data into usable information. This information is then given to the software developers to create an updated version of the broken software to block the successful methods used by the hackers to ensure such a situation never happens again (Hetler, 2022).

Application features:

There are many types of applications such as game apps, work apps and applications to help with clients' daily activities but it is very difficult to find applications that meets every expectation of the clients. This is where information systems come in, information systems collect the applications data and the clients reviews on the applications which is then stored, analysed and processed into information. This information is then given to the software developers who searches through the information to see what clients want their applications to do. The software developers then develop the new software in the form of application updates to add new features to the application that increases the overall performance of the application to meet more of the client's expectations.

Examples of such updates are Word, PowerPoint, Excel, and access updates which adds features such as better designs, recording features and keyboard short cut features to make them easier to use. Game apps such as Clash royal and Apex that are updated with new characters, maps and challenges. Applications used daily like galleries, camera and weather apps that are updated with features to make it more usable (Hetler, 2022).

Compatibility software:

Software developers regularly receive information from information systems about the performance of system software used in every computer. The system software used in computers are operating systems such as windows, Mac-OS and Linux which offers a UI, manages application execution, and manages hardware resources. The software developers review the performance of the operating systems to see if improvements can be made. The new software for operating systems will improve usability, add additional features and enhance user experience (Get safe online, 2023).

Data Visualization

Data visualization is the representation of data through use of common graphics, such as charts, plots, infographics, and even animations. Complex data links and data-driven insights are communicated in an understandable manner through these informational visual displays.

It is noteworthy that data visualisation is not limited to the use of data teams and can be employed for an array of purposes. In addition, management uses it to communicate hierarchy and organisational structure. Data scientists and analysts use it to find and interpret patterns and trends.

Idea illustration:

Data visualization for idea illustration helps in communicating ideas such as strategies and procedures. It can also be used for illustrating organisational structures or methods, allowing communication amongst the right individuals for specific assignments. It is frequently used in learning environments, such as tutorials, certification courses, and centres of excellence. Additionally, data modelling makes it simpler for developers, business analysts, data architects, and others to comprehend the relationships in a database or data warehouse by using abstraction to depict and better understand data flow inside an organization's information system.

Idea generation:

Data visualisation is widely utilised for inspiring team members to generate ideas. They are often used to help encourage the collection of multiple points of view and draw attention to the shared concerns of the group during brainstorming or Design Thinking sessions at the beginning of a project. Even though these tools of communication are typically rough and unpolished, they aid in laying the groundwork for the project by ensuring that all members of the team are in agreement about the issue that the important stakeholders want to see be solved.

Types of visualizations:

- Tables:

  This is a table with rows and columns for variable comparison. Although tables can present a lot of data in an organised manner, people who are only searching for broad trends may find themselves overwhelmed by them.

- Histograms:

  This graph shows the amount of data that falls inside a specific range by plotting a distribution of numbers using a bar chart (without spaces between the bars). An end user can quickly and easily identify outliers in a given dataset by using this graphic.

- Heat maps:

  These presentations of graphical representation are useful for visualising behavioural data according to location. This could be a webpage or a place on a map.

- Tree maps:

  They show layered shapes, usually rectangles, representing hierarchical data. Treemaps are an excellent tool for analysing the relative sizes of different categories based on the dimension of their areas.
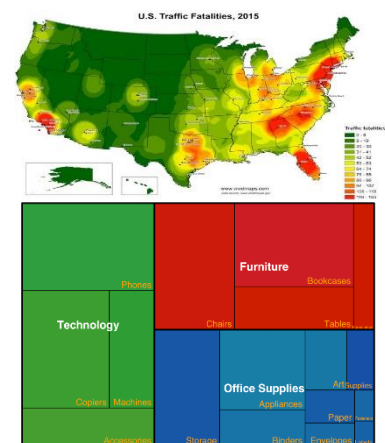

Pros of using Data visualization:

1. Better business decisions: You may easily create interactive and intuitive visualisations with data visualisation. It makes it straightforward to find important insights.

2. Easier trend analysis and exploration: They support you in quickly assessing past and present occurrences as well as forecasting future developments, such as possible increases or decreases in revenue and sales for the upcoming year.

3. Simplifies complex data: Large and complex datasets are simplified into a visual representation through data visualisation, which simplifies comprehension and understanding. It makes data easier to understand and more accessible for users.

4. Aids in decision making: Data visualisation helps to make decisions faster and more efficiently by emphasising important insights. Companies can make well-informed strategic decisions by swiftly evaluating their market trends, customer behaviour, competitive environment, and performance.

Information Quality

Academic integrity is of the utmost significance in the academic world. It entails upholding ideals like honesty, trust, fairness, respect, and accountability. This dedication to integrity applies to both students and faculty members in educational institutions, and it promotes trust and transparency in the learning environment. The academic community relies on these principles to guarantee that information is acquired in an ethical manner and to prevent academic misconduct, which might
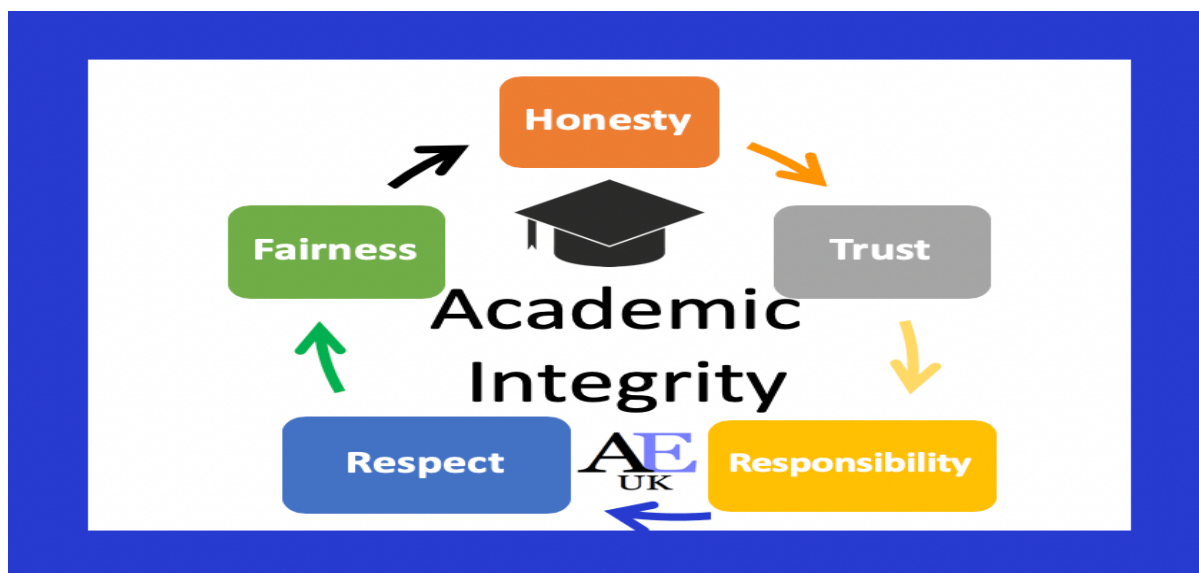
jeopardize the educational experience.

Defining Academic Integrity

The definition of Academic integrity is the assumption that everyone in the academic community, including students and instructors, would act honestly, trustworthily, fairly, respectfully, and responsibly. Academic integrity violations, often known as academic misconduct, can have significant implications and jeopardize the core of intellectual endeavours.

The Values of Academic Integrity are as followed:

Integrity is founded on the attribute of being truthful and free of dishonesty. Being truthful, giving credit to others, keeping promises, providing factual proof, and attempting to maintain impartiality are all part of it.

Certain reliance in the character, talent, strength, or truth of someone or something. Trust is crucial for a collaborative and free exchange of ideas within the academic community.

Fairness is the quality of being objective and fair, of treating everyone fairly, and of having clear and appropriate standards.

Respect is defined as having a high regard and regard for oneself and others, embracing other points of view, and appreciating the need to explore and develop ideas.

Responsibility is the ability to defend the ideals of integrity authentically and convincingly on an individual and organizational level, whether through moral, legal, or mental accountability.

Courage is defined as the mental or moral power to risk, endure, and overcome

danger, fear, or hardship. Courage entails acting on one's convictions even when faced with difficulties.

- Honesty, trust, and respect are the foundations of good academic work.
- It is critical to acknowledge the originators of ideas or research to honour their efforts.
- Acknowledging each person's contribution is essential since knowledge is a collective endeavour.
- Plagiarized work impedes genuine learning and personal growth. Your Role in Upholding Academic Integrity:
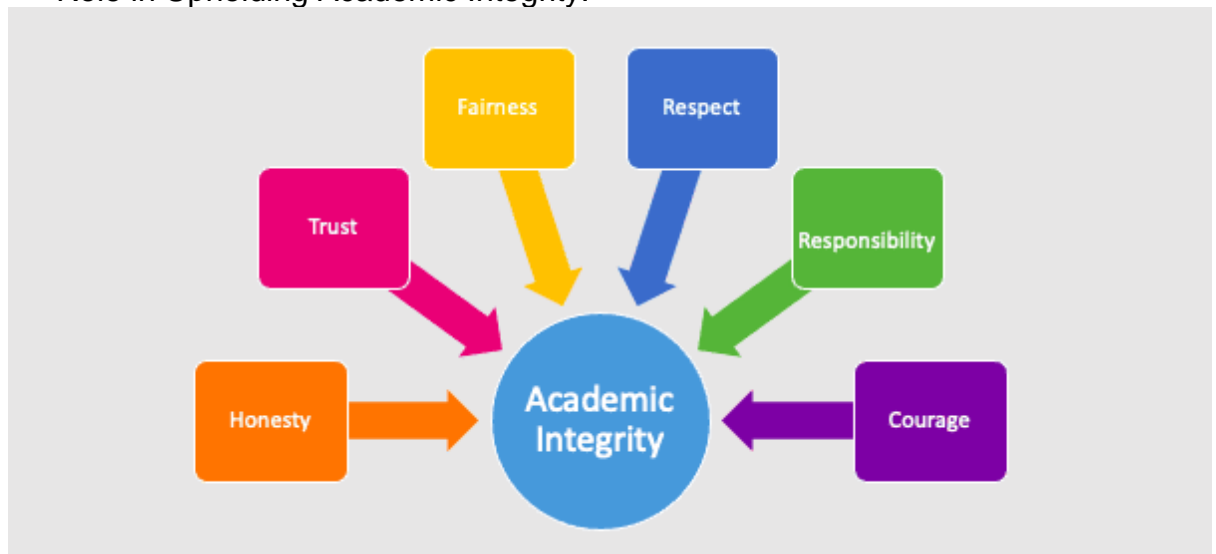
Everyone, whether a student or a member of the faculty, plays an important role in maintaining academic integrity. Practicing these ideals not only increases faith in your own work, but it also helps to establish an ethical scholarly community.

Practical Tips for Demonstrating Academic Integrity is to be truthful to yourself and others. To give credit to the original creators or producers of ideas or works. Keep pledges and carry out your duties. To approach your studies objectively, considering many points of view. To set clear expectations and follow through on them. To interact with others in a fair and unbiased manner. To show respect, listen intently, accept criticism, and appreciate variation. Take responsibility for your actions and follow institutional guidelines. In tough circumstances, be courageous in maintaining your integrity.

Academic integrity is more than simply a collection of norms; it is a dedication to individual and group greatness. Remember that academic integrity is about who you are as a person and how you perform when it matters when you begin your academic career. By embracing these principles, you contribute to an academic community culture of trust, respect, and accountability, laying the groundwork for a successful and ethical academic career.

Data Ethics

Data ethics is an important facet of modern corporate operations, especially in this age of technology and information-intensive workplaces. This eBook delves into the ideas and practices of data ethics, stressing its significance, commercial advantages, and role in developing consumer trust.

Data ethics is an important aspect of acceptable data practices. It assesses how data is gathered, created, analysed, and shared, with a focus on the implications for persons and society. This area of ethics governs data-related judgments, particularly in the context of AI and automation. Businesses that value data ethics stand to earn significantly.

Understanding Data Ethics:

Data ethics assesses the ethical implications of data processes, which include data collecting, analysis, and distribution. With the rising popularity of artificial intelligence (AI) algorithms, it is critical for firms to have an organized and transparent data ethics approach.

Business Benefits of Data Ethics

The Business Advantages of Data Ethics Businesses must design and maintain an organized and transparent data ethics plan in an era of increased AI usage. This method has several significant advantages: Trust is fostered when ethical standards such as fairness, privacy, openness, and responsibility are applied to how firms manage data. This trust improves reputation and brand value, resulting in increased consumer loyalty. Ethical Behaviour: Adhering to data ethics standards promotes fairness in decision-making by eliminating unexpected biases that might harm corporate outcomes.

Data Privacy Compliance: Data ethics is in line with data privacy legislation such as the GDPR and the CCPA, assuring compliance and lowering the risk of data misuse.

Implementing data ethics goes beyond simple compliance; it provides firms with concrete benefits:

- Building Trust: Fairness, privacy, openness, and accountability promote trust. Trust improves a company's reputation, brand value, and customer loyalty.
- Ensuring Fair Practices: Following data ethics standards aids in the elimination of unwanted biases. Fairness in decision-making improves corporate credibility.
- Data Privacy Compliance: Ethical AI operations are compliant with data privacy laws. Compliance with GDPR, CCPA, and other comparable requirements is easier to achieve through ethical data practices.

The Value of Data Ethics As trust becomes more crucial in business, ethical behaviour, particularly in data practices, takes centre stage. Consumers are eager to spend more for products and services from organizations they trust, and they are quick to quit companies that mishandle personal information.

Why is Data Ethics Important? During a global trust revolution, the implications of data mismanagement are more severe than ever:

- Trust as a Competitive Advantage: In the corporate world, trust is a precious commodity. Consumers are prepared to pay a premium for transactions with reputable businesses.
- Shift in Consumer Behaviour: The use of data in decision-making has changed consumer behaviour. Maintaining consumer confidence across the customer lifecycle requires ethical data practices.
- Trust Erosion Consequences: When trust is destroyed, businesses risk losing consumers. The implications of irresponsible use of personal data might be severe.

IMPORTANCE OF DATA ETHICS
DURING THE INTERPRETATION STAGE OF A DATA PROJECT

UNBIASED DATA PROMOTES FAIR OUTCOMES

RESPECTS PRIVACY AND ANONYMITY OF INDIVIDUALS

UPHOLDS PUBLIC TRUST IN DATA-DRIVEN DECISIONS

Building Customer Trust with Data Ethics Businesses must emphasize trust-building across the customer experience to counter the greatest danger to companies—loss of consumer trust. This entails: Developing Clear Value Exchanges: Ensuring that consumers receive advantages in exchange for contributing information and that the transaction is transparent and fair. Giving clients control over their data by giving options for managing its usage and sharing. Rapid Failure Response: Recognizing and handling data breaches and concerns to retain consumer confidence.

Data privacy protection has become a significant issue in the era of technology. It is necessary owing to the prominence of technology-driven and information-intensive company activities. Protecting data privacy necessitates consideration of both physical and ethical issues. In this section, we look at techniques for protecting data privacy while adhering to ethical values.

The Critical Importance of Data Privacy Protection The extensive use of technology and the rising hazards connected with information security highlight the need of data privacy protection. It is vital to limit these risks and guarantee proper data processing.

The Difficulty of Data Privacy Protection Data privacy protection is complicated owing to a new security worry, socio-techno risk. This danger is caused by the improper use of technology in data storage and processing. Data privacy protection is made more difficult by ethical transgressions and societal issues.

- Ownership:

  Individuals should be able to control their personal information. Obtain express consent via open communication and unambiguous agreements.

- Transparency:

  Data subjects have the right to know how their personal information will be collected, kept, and utilized. Transparency in data processes is essential for building confidence.

- Privacy:

  Protect the privacy of persons by safeguarding personally identifiable information (PII). Use data security techniques such as encryption and dual authentication.

- Intention:

  To guarantee ethical activities, assess the intent behind data collecting. Collect the bare minimum of data required for the intended purpose.

- Outcomes:

  Consider the various effects of data analysis on people or groups. Strive for positive results and be ready to deal with undesired consequences.

Methods for Protecting Data Privacy A comprehensive approach is required to solve the complexity of data privacy protection. This method employs a six-factor framework: IDPPs (International Data Privacy Principles): These principles guide the development and implementation of data privacy policies, guidelines, and mitigating mechanisms. Personal data protection principles (DPPs) in Hong Kong: These principles serve to strengthen current policies and recommendations. The operationalization framework for hexa-dimension metrics: This framework aids in the implementation of policies, standards, and recommendations by assuring technological efficiency, economic feasibility, legal rationale, ethical consistency, and social acceptability.

Ethical issues are critical in a data-driven environment. Businesses may not only comply with legislation but also create trust, encourage consumer loyalty, and contribute to a more responsible and sustainable digital future by emphasizing data ethics.

In today's data-driven society, data privacy and ethical data use are critical. Businesses may secure data privacy while functioning ethically and responsibly by creating stringent regulations, adhering to ethical standards, and utilizing suitable frameworks.

AI and information systems in business

Role of AI in Information Systems

Artificial intelligence is a subset of IT that has the ability to observe their surroundings, understand the data collected, and generate actions based on the data they processed. (Kolbjørnsrud, et al., 2017)

According to Uzialko (2023) , artificial intelligence is already redefining almost all business operations across all industries. Uzialko further explains that Artificial Intelligence is typically considered as an asset, not as a substitute for human intelligence and innovation. While AI still struggles to do practical tasks in the real world, it excels at processing and analyzing vast amounts of data far more quickly than a human brain could.

AI will become as commonplace as spreadsheets, statistical software, and ERP systems. Much more businesses may reengineer their processes by utilizing AI platforms as an instrument within the larger framework of process reengineering stand to benefit the most in the long term. (Davenport, et al., 2023)

AI technologies such as Machine Learning, Natural language processing, Computer vision and Robotics are implemented in structures like manufacturing, customer services, databases and workforce engagement. AI has the potential to automate intricate procedures, optimize resource utilization, and enhance the prediction and adaptation of potential challenges and opportunities. (SAP, 2023)
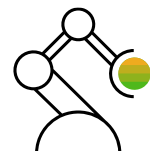
| Machine learning | Natural learning processing | Computer vision | Robotics |

Picture provided by System Analysis Program Development

Practical applications

Three specific business demands may be supported by artificial intelligence: Process Automation, which involves automating company operations; Cognitive Insight, which involves acquiring insight via data analysis; and Cognitive Engagement, which involves interacting with clients and staff. (Davenport & Ronanki, 2018)

Process Automation

Cyber security: Algorithms for fraud detection and cybersecurity also rely on machine learning, with some of them being AI implementations. They sift through massive volumes of data, looking for unusual trends, and take action to stop any possible breaches or credit card theft. (Marr, 2023)

<u>Cognitive Insight</u>

Data input is only one of the numerous manual processes that organizations have utilized AI to automate. To manage cognitive activities like writing messages and summarizing reports, they are now implementing next-generation intelligence, such as generative AI. When AI is integrated with databases, the technology not only makes it possible for employees to search through data, including institutional files or industry-specific information, but also arranges and condenses the information. (Guinness, 2023)

<u>Cognitive Engagement</u>

Customer service: AI can provide marketing content and optimizes client communication by utilizing auto- correctors and translators. The whole customer experience has become more streamlined and tailored as AI is being incorporated into a wider range of consumer engagement channels. (Guinness, 2023)

Optimizing training and development: Businesses are using AI-driven work coaching systems for their staff members. Experts clarified that the system could monitor, evaluate, and offer feedback on activities in almost real time, allowing for coaching or process guidance for employees. (Pratt, 2023)

Future trends in AI integrated information systems

Quantum AI- Controllable quantum mechanical devices, known as quantum computers, use the principles of quantum physics to carry out calculations. It is in its "utility" and development phase but promises to surpass the performance of the most powerful supercomputers available today, if correctly scaled. (Microsoft, 2023).

Augmented reality will enhance business environments and utilized in training and development of staff. It can improve project planning by visualizing the architectural compositions of a project. (Szleter, 2023)

Cloud computing paradigms like Software as a Service (SaaS), Infrastructure as a Service (IaaS), and Platform as a Service (PaaS) will be replaced with an Everything- as- a- Service (XaaS) dynamic, in which IT operates as a flexible product contributing to innovation. (Capers, 2021)

IoT will be improved by implementing Real-time local data processing with advanced edge computing and sensor-equipped devices will communicate with one another, make choices without human input, and activate recovery systems. (Capers, 2021)

Generative AI incorporated with Microsoft and Google applications, which will enable users to have a built-in AI assistant when writing emails and summarizing meetings. (Metz, 2023)

Within the legal industry, GPT-4 is already competent enough to pass the bar test, and PricewaterhouseCoopers, an accounting firm, intends to introduce a legal chatbot powered by OpenAI to its employees (Metz, 2023). Therefore businesses will implement AI in legislation and human resources in future.

Information Systems integration in a business

System integration is the process of linking all of an organization's IT systems, technologies, applications, and software to enable them to work as a unified system. It serves as a translator

HOW API WORKS

altexsoft
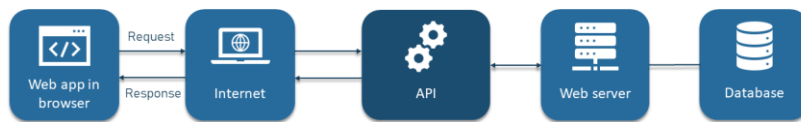
between various programming languages, hardware, and codes to enable uninterrupted and smooth data flow. (Ganguly, 2023)

The Key elements of enterprise integration, as identified by IBM Cloud Education (2021), follow:

Middleware is known as an invisible software layer that links distributed systems, applications, services, and devices together. APIs and EDIs are common ways to achieve connectivity.

Application Programming Interfaces (APIs) enables data transmission between software products. They can be implemented in databases, operating systems, and web applications. APIs serve as an abstraction layer between two systems, and conceals the operational specifics of the connection.

Electronic data interchange (EDI) refers to the transmission of business information in a common electronic format EDI typically occurs through two channels: direct Internet connections or value-added networks (VANs), where data transfer is handled by a third-party network.

The complexity of system integration varies based on the quantity and kind of components required, and this may be addressed using the following architectural approaches:

Vertical integration:

This approach refers to the division of subsystems into functional groups. This process is accelerated by utilizing a small number of vendors, partners, and developers for each layer. Although it is thought to be the fastest integration approach, it involves a large financial commitment, therefore increasing risk. (Ganguly, 2023)

Horizontal integration:
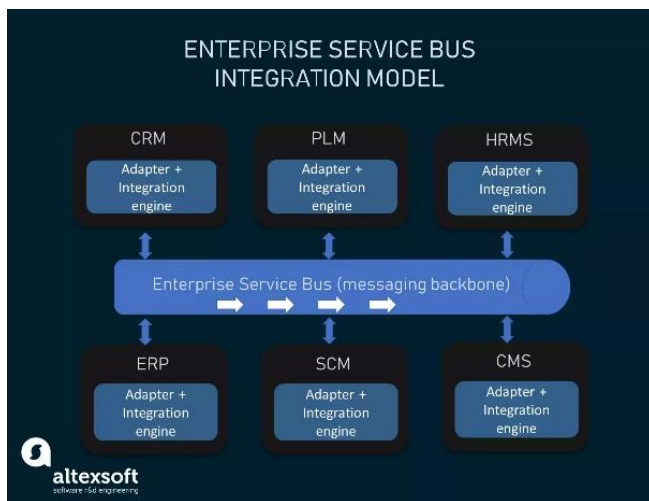
This is also known as the Enterprise Service Bus. An EBS is a specialised subsystem that acts as a common user interface layer linking other subsystems. By reducing the number of interfaces that link directly to the ESB, it offers flexibility and lowers integration costs by serving as a messaging backbone. (Ganguly, 2023)

Picture provided by altexsoft

Point-to-point integration (P2P):
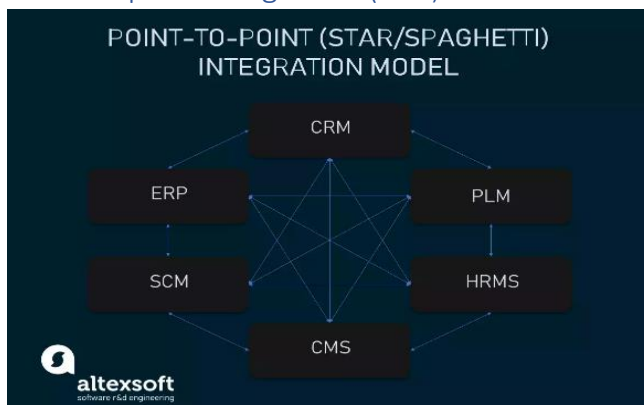
This architectural pattern is also known as a star- or spaghetti integration and connects each system directly to all other systems and applications with which it must cooperate and exchange data. Custom code, webhooks, and APIs can all be used to implement this paradigm. (Ganguly, 2023)

Picture provided by altexsoft

Hub and Spoke integration:
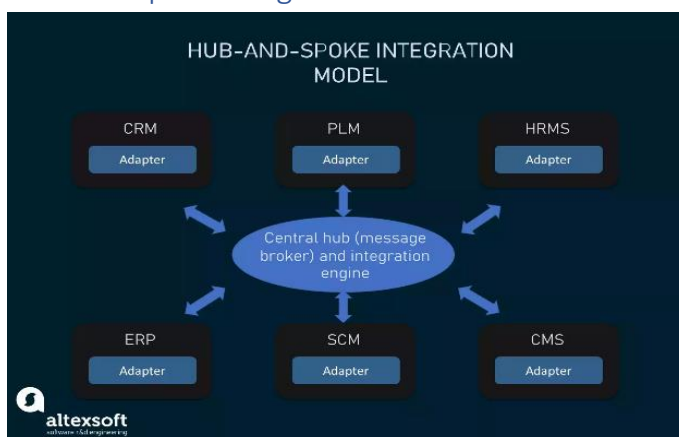
This integration architecture addresses the shortcomings of the Point- to- Point system. Subsystems do not directly interact with one another; instead, a central hub (message broker) manages the connections between all of them. (Ganguly, 2023)

Ganguly concludes that all kinds of integrations are beneficial, whether they are carried out for enterprise resource planning (ERP) or customer relationship management (CRM). It is therefore important to realign existing information systems to be integrated with AI and the appropriate architectural system design, which will enable a business to meet quickly evolving customer needs, improve efficiency, save costs, and generate competitive advantages.

Customising information systems

Information customization (IC) systems tailor information to the user's requirements and interests. They operate in a proactive (initiative-taking) manner, constantly searching for relevant resources, evaluating and contrasting content, picking out pertinent data, and presenting it in a condensed or visualized way. It's difficult to create software that can communicate with the variety and breadth of web resources, but IC systems' potential is starting to look quite appealing. The correct information should find the users rather than the users having to put in a lot of effort to find it. In an effort to do this, IC systems automate a number of tasks now performed by information retrieval systems and offer tools for making the best use of available data.
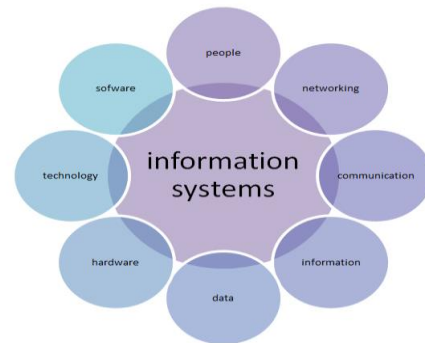
Nearly all medium-sized and big businesses rely on information systems, also sometimes called business or enterprise systems. It gives a summary, supervises procedures, and supplies crucial information for operational and strategic choices. Businesses are able to deal with information and automate and streamline operations because of information systems. Because most firms have developed custom information systems for almost a decade, we are able to design, implement, and maintain an information system that will adapt to your changing demands.

After all the components are combined, each information system serves a variety of purposes for companies, each with a different level of significance based on the demands of the business.

- **Store and analyse data:**
  Business functions, customers, transaction data, and both employee and customer activity are all covered by sophisticated and extensive databases, which are occasionally cloud-based. The insights derived from these assessments can assist decision-makers in resolving present and future problems.

- **Aid in decision-making:** Information systems are able to compare internal insights with information from other sources, such as rivals' financial reports or information

about the overall health of the economy. These insights help decision-makers assess the suitability and calibre of their strategic choices.

- **Assist with business processes:** Information systems are used to develop value-added systems for business functions. Business processes can be simplified, and unnecessary activities can be streamlined through the use of information systems adapted to common business tasks, such as manufacturing, supply chain, and employee processes.
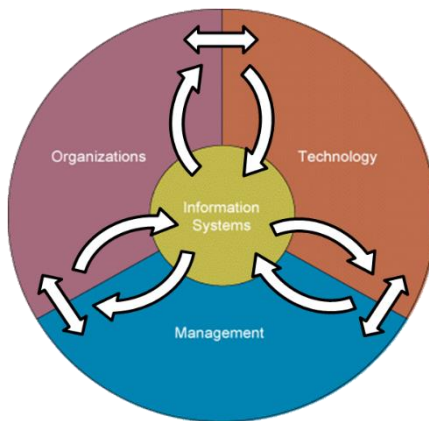
Executives and managers of businesses are required to become well-versed in business information systems and their capabilities as these systems grow more and more ingrained in the corporate sector. As a result, the curriculum for many MBA programs now includes information technology.

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